SUMMARY OF TELEPHONE INTERVIEW

The undersigned would like to thank Examiner Chu for the courtesy of a telephone interview on April 14, 2009. We discussed claim 1 of the present application and U.S. Patent No. 5,446,497 to Keating (hereinafter "Keating") and U.S. Patent 5,526,053 to Dorricott (hereinafter "Dorricott"). We agreed during the interview that the independent claims overcome the 35 U.S.C. §103(a) rejections presented in the February 25, 2009 Official Action.

REMARKS

Claims 1-20 remain for further consideration. No new matter has been added.

The objections and rejections shall be taken up in the order presented in the Official Action.

3. Claims 1, 3-12 and 14-19 currently stand rejected for allegedly being obvious in view of the combined subject matter disclosed in U.S. Patent 5,526,053 to Dorricott (hereinafter "Dorricott") and U.S. Patent 5,446,497 to Keating (hereinafter "Keating").

CLAIM 1

Claim 1 recites a method for motion-vector-aided interpolation of a pixel of an intermediate image lying between two input images. The method includes:

> "selecting a first pixel from the first input image and assigning a **first video information value** to the first pixel using a first motion vector;
>
> selecting a second pixel from the second input image and assigning a **second video information value** to the second pixel using the first motion vector;
>
> selecting a third pixel from the first input image and assigning a **third video information value** to the third pixel using a second motion vector;
>
> selecting a fourth pixel from the second input image and assigning a **fourth video information value** to the fourth pixel using the second motion vector;

> determining a first interval specified by the first video information value and the second video information value or a second interval specified by the third video information value and the fourth video information value; and
>
> mixing the video information values by multiplying the **first video information value** by a first weighting factor, the **second video information value** by a second weighting factor, the **third video information value** by a third weighting factor, and the **fourth video information value** by a fourth weighting factor and adding the weighted video information values to obtain **a video information value of the pixel of the intermediate image**, the weighting factors being chosen such that the video information value of the pixel of the intermediate image lies within the determined first or second intervals." (cl. 1, emphasis added).

The Official Action acknowledges that Dorricott fails to teach the feature of "*mixing the video information values....*" (Official Action, pg 4). However, thereafter the Action contends that Keating "*teaches mixing of the video information values with the weighted video information (interpolation coefficient) values so obtained in order to obtain a video information value of the pixel of the intermediate image (output field), the weighting factors being chosen such that the video information value of the pixel of the intermediate image lies within the determined first or second intervals (The output pixel is obtained by combining the values of the pixels located in the progressive scan frame.) (col. 15, lines 36 – 66).*" (Official Action, pgs 4-5). Specifically, the Action contends that "*Keating teaches (1) two motion vectors (Fig. 11); (2) each vector having two pixels for a total of four pixels (Fig. 11, 2 pixels in Frame 1 and 2 pixels in frame 2.); and (3) two interpolation coefficients – one for each motion vector....*" (Official Action, pg 2). The Action further contends that it would have been obvious to a person of ordinary skill to have combined the teachings of Dorricott with Keating. Applicants respectfully submit that this is a technically inaccurate reading of the combination of Dorricott and Keating.

First, in contrast to claim 1, Keating teaches, as illustrated in FIGS. 3, 6 and 10, that "*the outputs of the multiplexer 20 are supplied to a pixel vector selector 40 the outputs of which is*

connected to an interpolator 41." (Keating, col. 14, lines 52-54). "*The purpose of the pixel vector selector 40 is to select from the input frame of motion vectors* ***a motion vector*** *for each pixel of the output field to be produced.*" (Keating, col. 14, lines 62-64, emphasis added). Regarding the pixel vector selector 40, Keating teaches the following:

> "*FIG. 11 illustrates schematically two motion vectors (vector 1 and vector 2) to be tested for an output pixel 50 of an output field 52 to be generated from two 24 Hz frames, frame 1 and frame 2. When viewed in this way, it can be seen that the ends of each motion vector "point" to pixels in each of the progressive scan frames. For example, vector 1 points to respective pixels 54 in frame 1 and frame 2. The degree of correlation between the 5 X 5 patches of pixels surrounding the pixels 54 in the input frames is then calculated. The degree of correlation between the pixel patches is determined by calculating the absolute luminance difference between pairs of pixels at corresponding positions in the two 5 X 5 patches. These absolute luminance* ***difference values*** *are then added to produce a* ***sum*** *of absolute luminance differences (SAD) associated with the motion vector under test. A high SAD value indicates a low degree of correlation between the patches compared, and a low SAD value indicates a high degree of correlation between the patches. The SAD value is calculated for each of the motion vectors to be tested for each output pixel, and* ***the motion vector having the lowest SAD value is selected*** *as the motion vector for that output pixel. The output pixel vectors are then supplied by the pixel vector selector 40 to the interpolator 41.*" (Keating, col. 15, lines 10-35, emphasis added).

Thus, according to a fair and proper reading, Keating teaches that the pixel vector selector 40 selects one of the motion vectors in the input frame (e.g., one of the two motion vectors illustrated in FIG. 11) having the lowest calculated SAD value and thereafter outputs a single motion vector to the interpolator 41. (Keating, col. 14, lines 62-64 and col. 15, lines 10-35). The SAD values are calculated by adding the absolute luminance difference values between pairs of pixels. (Keating, col. 15, lines 20-26). Significantly, there is NO teaching or suggestion that the SAD values are multiplied by any weighting factor in the pixel vector selector 40. In contrast, Keating explicitly teaches appropriately weighting pixels in the interpolator 41. (Keating, col. 15, line 51). That is, the pixel vector selector 40 merely selects a motion vector having the highest

SAD value, which has NOT been multiplied by a weighting factor. Therefore, the pixel vector selector 40 taught in Keating is incapable of teaching the feature of "***mixing*** *the video information values by* ***multiplying*** *the first video information value by a first weighting factor, the second video information value by a second weighting factor, the third video information value by a third weighting factor, and the fourth video information value by a fourth weighting factor and adding the weighted video information values to obtain a video information value of the pixel of the intermediate image, the weighting factors being chosen such that the video information value of the pixel of the intermediate image lies within the determined first or second intervals.*" (cl. 1, emphasis added)."

Second, Keating further teaches that "*[f]or each output pixel, the interpolator 41 uses the motion vector supplied for that output pixel....*" (Keating, col. 15, lines 42-43, emphasis added). Thus, according to a fair and proper reading, Keating teaches that the interpolator uses a single motion vector to produce each output pixel, and NOT first and second motion vectors as recited in claim 1. (Keating, col. 14, line 62 to col. 15, line 66). That is, the pixel vector selector 40 contemplates the two motion vectors, selects one of the motion vectors (without using a weighting factor), and outputs that single motion vector to the interpolator 41 for interpolation. Therefore, the interpolator 41 merely uses the single selected motion vector outputted from the pixel vector selector 40 to produce the output pixel. (Keating, col. 14, line 62 to col. 15, line 66). That is, Keating does not teach or suggest using the non-selected motion vectors or information from the non-selected motion vectors to produce the output pixel.

Additionally, Keating teaches that "*[t]he values of each output pixel is obtained by combining the values of the pixels located in the progressive scan frames with appropriate weighting in dependence upon the interpolation coefficients....*" (Keating, col. 15, lines 49-53).

Thus, even assuming the pixel vector selector 40 and the interpolator 41 were a single unit, it would merely (1) select a single motion vector by determining the SAD values, as described above, and thereafter (2) weigh pixels in the progressive scan frame using the single motion vector. That is, even if one of the interpolation coefficients was zero, it would merely be applied to the single motion vector received by the interpolator 41. Therefore, Keating is incapable of teaching the feature of "***mixing*** *the video information values* ***by multiplying*** *the first video information value by a first weighting factor, the second video information value by a second weighting factor, the third video information value by a third weighting factor, and the fourth video information value by a fourth weighting factor and* ***adding*** *the* ***weighted video information values*** *to obtain a video information value of the pixel of the intermediate image*...", where the first and the second video information values are assigned using a first motion vector and the third and the fourth video information values are assigned using a second motion vector. (cl. 1, emphasis added).

Third, Dorricott, in the cited section of column 9, lines 19-29 which refer to FIG. 9, discloses the use of two motion vectors Va and Vb in determining a block 520 of pixels of the output field: "*projection of the motion vectors Va and Vb along the respective vector directions leads to a block 520 of the output field being assigned both of the motion vectors Va and Vb.*" Since Keating, as discussed above, teaches the use of a single motion vector instead of two motion vectors in determining the interpolated pixel (in contract to selecting a single motion vector from the motion vectors in the input frame using the pixel vector selector 40), there is no reasonable expectation of success of achieving all of the features of the "mixing" step of claim 1 and also of determining the block 520 of pixels of the output field of Dorricott if the teachings of Dorricott and Keating were combined as suggested in the Official Action.

In summary, the combined teachings of Dorricott and Keating fails to disclose at least the features of claim 1 of "*mixing the video information values by multiplying the first video information value by a first weighting factor, the second video information value by a second weighting factor, the third video information value by a third weighting factor, and the fourth video information value by a fourth weighting factor and adding the weighted video information values to obtain a video information value of the pixel of the intermediate image, the weighting factors being chosen such that the video information value of the pixel of the intermediate image lies within the determined first or second intervals.*" (cl. 1). Therefore, the combined references are incapable of rendering claim 1 obvious. As a result, it is respectfully submitted that the obviousness rejection with respect to claim 1 is moot and should be removed, and that claim 1 is in condition for allowance.

CLAIM 12

As claim 12 currently stands rejected for the identical reasons as claim 1, the arguments above with respect to claim 1 are equally applicable to claim 12. As a result, it is respectfully submitted that the obviousness rejection with respect to claim 12 is moot and should be removed, and that claim 12 is in condition for allowance.

CLAIM 20

As claim 20 currently stands rejected for the identical reasons as claim 1, the arguments above with respect to claim 1 are equally applicable to claim 20. As a result, it is respectfully submitted that the obviousness rejection with respect to claim 20 is moot and should be removed, and that claim 20 is in condition for allowance.

CLAIMS 3-11 AND 14-19

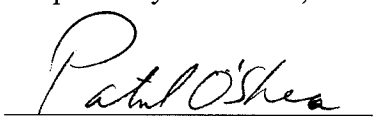
It is respectfully submitted that these rejections are now moot since claims 1 and 12, from which claims 3-11 and 14-19 depend, are patentable for at least the reasons as set forth above.

4. The indication that claims 2 and 13 are objected to but would be allowable if rewritten to no longer depend on a rejected base claim is noted and appreciated.

For all the foregoing reasons, reconsideration and allowance of claims 1-20 is respectfully requested.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,



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